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Poster Abstracts

Food Microbiology & Human Health

PO2-SB-193

A DETAILED VIEW OF LISTERIA MONOCYTOGENES' ADAPTATION AND SURVIVAL UNDER COLD TEMPERATURE STRESS

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Abstract Content: The human pathogen *Listeria monocytogenes* (*Lm*) continues to be a challenge for the food industry where it is known to contaminate ready-to-eat foods and grow during refrigerated storage. In order to gain increased control of *Lm* in the food-supply-chain, an improved understanding of low temperature stress adaptation methods is needed. In this study, RNA-seq (strand specific Illumina libraries; 22-39 million 2x100bp reads) and cell membrane fatty acid profiling were used to analyze adaptation mechanisms used by a fast growing, serotype 1/2a, *Lm* food plant isolate at 4°C. Brain heart infusion (BHI) broth pre-tempered to 20 or 4°C, was inoculated with 10^7 CFU/ml of stationary phase (SP) cells grown at 20°C in BHI, and incubated at 20 and 4°C. RNA and lipids were extracted at T1– early lag phase (LP), T2 – end of LP, T3 – mid-exponential, T4 – transition to SP, and T5 – late SP (T5+4 h or 2 days for 20 and 4°C respectively). The number of coding transcripts upregulated (>2 $\log_2$, $p<0.05$) at 4°C relative to 20°C was 142, 96, 91, 45, and 388 from T1-T5 respectively, while the number of downregulated genes at T1-T5 was 91, 38, 56, 125, and 256 respectively. Notably, the greatest differential gene expression occured in *Lm* cells during late SP at 4°C, the most relevant physiological state to *Lm*'s survival in chilled food products. Common among all time points was the upregulation of nine genes required for branched-chain fatty acid (BCFA) synthesis, which was supported by an increase in membrane BCFAs from 77% at T1-4°C to 93% at T5-4°C. Putative cold stress regulatory mechanisms could be observed through negatively correlated expression levels of sense and antisense RNA. This research highlights *Lm's* response to cold stress and provides deeper insight into how refrigerated storage conditions influence microbial gene expression and physiology.

Disclosure of Interest: None Declared

Keywords: cold stress, Food Safety, Listeria monocytogenes, RNA sequencing, time course